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# Family Mathematics Night

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# Disclaimer

# FAMILY MATHEMATICS NIGHT

by

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ABSTRACT

Family Mathematics Night

The purpose of this project was to develop a family mathematics night program that would encourage parental involvement in mathematics education thus, enhancing student achievement in mathematics. Parents attending the program would: (a) become familiar with the current mathematics program used by their children; (b) learn mathematics games to play at home with their children; and (c) be introduced to various child appropriate, mathematics web sites on the Internet. Much of the material presented was recapped in a mini-guide to fourth grade mathematics that was given to all the families. This guide is a tool for the parents to use at home while helping their children with mathematics. The project was reviewed by master teachers to ensure that the project goals were attained. Limitations to the project and suggestions for further study were included in Chapter Five.

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# Chapter 1

## INTRODUCTION

Educators have always considered parental involvement an important factor for student academic achievement. Given the proper guidance and information, likely, the majority of parents would become involved in their child's mathematics education. If parents are provided with the tools and skills needed to understand their child's mathematics, the educator could enlist valuable partners as both work toward students' academic success in mathematics. While parental involvement in mathematics positively affects children's achievement, many parents feel unable to assist their children with mathematics because they do not understand the manner in which students are taught mathematics today.

### Statement of the Problem

Parental involvement and promotive behaviors and attitudes toward mathematics have been found to positively affect children's achievement (Jacobs & Bleeker, 2004). Unfortunately, many parents feel unprepared to help their children with mathematics programs that they, themselves, do not understand. Usually, negative parental feelings toward mathematics translate to negative behaviors in children. While parents may have learned their mathematics through rote repetition and practice, today, students are taught mathematical concepts much differently. This can frustrate even the most involved

parents if they lack the tools necessary to help their child achieve in mathematics.

## Purpose of the Project

The purpose of this project will be to develop a family mathematics night program, to which parents will be invited, to promote parental involvement in mathematics education. The author of this project intends to: (a) familiarize parents with the current mathematics program used by their students; (b) promote mathematical learning through the use of games; and (c) introduce the parents to various student appropriate, mathematics computer games.

## Definition of Terms

The follow list of words and phrases are terms that will be used throughout the proposal:

*Algorithm:* A procedure used to solve a mathematical problem in a finite number of steps that frequently involves repetition of an operation (Woolf, 1973).

*Internet*: The vast collection of interconnected networks that are connected by the TCP/IP protocols (Enzer, 2006).

*World Wide Web*: The whole constellation of resources that can be accessed by use of HTTP and HTML (Enzer, 2006).

## Chapter Summary

Parents want their children to succeed in school, and most are quite willing to help with the learning process when and if they are able to do so. It is this researcher's position that parents' involvement with their child's mathematics education will result in greater student achievement. Also, it is this researcher's position that parents need to be

familiar with their child's mathematics curriculum in order to feel adequately prepared to promote study at home. Parents and students must be made aware that mathematics are more than problems to be solved in a textbook. Through the introduction of mathematics through games and computer connections, students and their parents should feel more connected to and comfortable with mathematics.

In Chapter 2, the Review of Literature, this researcher will present background material to support the idea for a family mathematics night. In Chapter 3, Methods, the procedure to develop the project will be detailed in order to develop the program. This section will be developed to show step-by-step, how instructors can encourage parents and students to develop an understanding of mathematics as they participate in engaging mathematics activities.

# Chapter 2

# REVIEW OF LITERATURE

In general, members of society have always supported the idea that parental involvement has a positive influence on students' academic achievement (Fan & Chen, 2001). Many educators consider parental involvement an important component in students' education and welcome this partnership with parents. However, parental involvement can take several different forms and be impacted by: (a) gender stereotypes, (b) family socioeconomic attributes, and (c) ethnic background. Thus, the degree to which parental involvement affects student achievement will vary. By understanding these dynamics, educators can be better prepared to offer parental involvement opportunities that are more likely to improve student academic success. Therefore, the purpose of this project will be to help elementary educators effectively involve parents in their child's mathematics education.

## Parental Involvement and Student Achievement

The literature on parental involvement in child and adolescent education conveys the clear assumption that parents' involvement benefits children's learning (Chavkin, 1993; Eccles & Harols, 1994; Epstein, 1989, 1994; Hess & Holloway, 1984; all cited in Hoover-Demspey & Sandler (1995). Usually, student outcomes are assumed to be influenced by parental involvement which, in turn, are assumed to be influenced by

factors related to the parents such as: (a) socioeconomic factors, (b) parental attitudes, or (c) teacher behaviors. In their study, Hoover-Dempsey and Sandler acknowledged these assumptions and focused instead on three aspects of parental involvement: (a) why parents become involved in their children's education, (b) how parents choose specific types of involvement, and (c) why parental involvement has a positive effect on student achievement.

Hoover-Dempsey and Sandler (1995) suggested that parents become involved in their children's education for three major reasons: (a) their personal belief of the parenting role, (b) their personal sense of efficacy to help children succeed in school, and (c) their response to the opportunities or demands presented by both their children and their children's school. This means that parents must believe that they should be involved in their children's education, that they possess the skills to help their children, and that they believe the activities and outcome are worthwhile. Also, Hoover-Dempsey and Sandler explained that, while parents may be offered many opportunities for involvement, unless the first two criteria are met, they are not likely to be influenced to become involved in their child's education.

As reported by Hoover-Dempsey and Sandler (1995), parents, who choose to become involved, select levels and forms of involvement that are consistent with their own thoughts and beliefs. In general, parents choose forms of involvement in which they believe they can be successful. Once the type of involvement is selected, then parents must balance the involvement with other demands in their lives such as family responsibilities and employment. Finally, the parent's choice of involvement is

influenced by the specific opportunities and demands that are conveyed by the child or the school.

> The child who asks for homework help will tend to influence the parents to become involved in monitoring and reviewing homework; the child who pleads with the parent to come on a field trip will tend to influence the parent to become involved in providing transportation and chaperoning the trip. Similarly, the teacher who sends home specific homework assignments involving five minute parent child interactions will tend to encourage parents' homework involvement. (p. 318)

Lastly, Hoover-Dempsey and Sandler (1995) explained three primary mechanisms of parental influence on children's academic achievement: (a) modeling, (b) reinforcement, and (c) direct instruction. When parents become involved in their child's education, they model positive behaviors and attitudes about education. The parents show their children that school and school related activities are important. Also, parental reinforcement of school appropriate behaviors may boost children's success in school. Often, parents give their children praise, attention, and rewards related to behaviors that are fundamental to a successful school experience. Finally, direct instruction by parents, combined with positive parental attitudes, can boost skill and knowledge in areas in which the child may be struggling. The parents and teachers become partners to increase student achievement.

Even though parental involvement is in the national spotlight, the ways to turn these ideas into general practice are lacking (Desimone, 1999). The increasingly diverse student population in this country requires that specific needs be addressed, evaluated, and considered in order to improve the academic and social outcome of ethnic minority

and low income students. Therefore, researchers and educators must understand how parent involvement can best be used for all students, especially those at risk for educational failure (Epstein, 1992; Palanki & Burch, 1992; both cited in Desimone). This informational gap was addressed by Desimone when she analyzed the relative contributions of different types of parental involvement to several measures of student achievement and then examined how these relationships vary for students from different ethnic and economic backgrounds.

The results from Desimone's (1999) study showed that there were significant and meaningful differences in the relationship between student achievement and parental involvement according to the students' race and family income. Desimone demonstrated that traditional parental involvement measures were better predictors for Anglo, Asian, and middle income students than for Hispanic, African American, and low income students. Also, parental involvement was more predictive of grades than test scores for students of all ethnic and income groups. Parental involvement at the school level builds relationships between the parent and teacher, and this can positively affect teachers' perceptions of students.

According to Desimone (1999), important differences in the relationship between parent involvement and student achievement were based on the type of involvement, whether it was reported by the student or parent, and how achievement was measured. For example, while school level volunteering was a better predictor for Anglo and middle income students, PTO involvement was a stronger predictor of grades for African American students. This result suggested that this type of school level contact might

offer traditionally disempowered African American parents an opportunity to participate in advocacy and decision making roles in the school. Another interesting result from Desimone's study was that contact with the school about academics had a negative association for all types of achievement. Conversely, student reported discussions with parents were one of the best predictors of achievement, compared with other parent involvement variables. The greatest correlation was found for Anglo American students and middle income students. Desimone suggested that this stronger relationship with achievement might be due to the fact that the nature of the discussions might be different for mainstream families who would tend to focus on a review of the school day or ask specific questions about what a child learned. Other families might focus on the review of homework assignments, behavior, and safety issues.

Fan and Chen (2001) conducted a quantitative meta-analysis to synthesize the quantitative literature about the relationship between parental involvement and students' academic achievement. Specifically, they used two questions to guide the study.

1. What is the strength of the general relationship between measured parents involvement and students' academic achievement?
2. What are some potential study features that have moderating effect on the relationship between parental involvement and students' academic achievement? (p. 5)

Fan and Chen (2001) found that parental aspiration and expectation for their children's educational achievement had the strongest relationship with academic success. However, parental home supervision had the weakest relationship with academic success. In addition, this relationship was stronger when academic achievement was represented by more global indicators of academic achievement such as school grade point average,

than by subject specific indicators such as mathematics grade.

*Mathematics Achievement*

The important role that parents play in shaping their children's values and achievement behavior has been well documented, yet little research has been conducted to demonstrate the relationship between parents' behavior and their children's attitudes and interest toward mathematics (Jacobs & Bleeker, 2004). Jacobs and Bleeker, researchers in the field of psychology, conducted an 8 year study to determine whether parents' mathematics and science promotive behaviors and attitudes would affect their children's later: (a) values, (b) activity choices, and (c) achievement in these subjects. They found that parents' attitude and actions played a role in helping to develop a child's achievement in mathematics.

Two important trends in this study were noted by Jacobs and Bleeker (2004). First, parents were more likely to purchase mathematics and science items for sons rather than daughters, regardless of the child's grade in school. Jacobs and Bleeker noted that this finding was surprising because their analyses revealed that girls were more interested in mathematics and science than were boys. Secondly, although boys were given more mathematics and science related toys, parents were more involved in daughters' mathematics and science activities. Jacobs and Bleeker believed that this may demonstrate parents' perceptions that daughters need more help with the activities. This interpretation was supported by findings from previous research (Desimone, 1999; Epstein, 1988; Hoover-Dempsey & Sandler, 1995; all cited in Jacobs & Bleeker) in which it was found that parents were more likely to be involved in activities with their children

if they believed the child needed help.

In a subsequent study, Bleeker and Jacobs (2004) focused on the long term effects of parental beliefs and the career and educational choices of older adolescents and young adults. In this longitudinal study, the researchers followed a group of students and their mothers over a period of 12 years. Bleeker and Jacobs noted that the most important finding from this study was the enduring links between mothers' early expectation for their children and their later mathematical abilities and subsequent career or educational choices.

## The Everyday Mathematics Program

The Everyday Mathematic Program (2002) is a research based curriculum developed by the University of Chicago School Mathematics Project (UCSMP). Prior to the release of the program, the researchers at UCSMP reviewed existing research on children's mathematical thinking and on curriculum and instruction. Also, the researchers interviewed hundreds of children in elementary schools and surveyed instructional practices in other countries (Everyday Mathematic Center, 2003). According to Isaacs, Carrroll, and Ball (2001), this research led the Everyday Mathematics authors to a number of principles for curricular development. These include:

1. children begin school with a great deal of knowledge and intuition on which to build.
2. the curriculum should begin with children's experience and should work to connect that experience with the discipline of mathematics.
3. curriculum development should proceed grade by grade starting in Kindergarten so that each grade can build on proven outcomes of the previous grade.

4. the curriculum should be more than just arithmetic; geometry, data analysis, measurement, probability, algebra, and problem solving can be taught in elementary school.
5. the curriculum should be balanced: concepts, skills, facts, and tools are all necessary.
6. excellent instruction is important.
7. reforms must take account of the working lives of teachers.
8. the pace should be brisk.
9. topics should be arranged in a helix; practice should be distributed rather than masses.
10. the curriculum should make use of manipulatives and calculators.
11. the curriculum should include practical routines to help build the arithmetic skills and quick responses that are essential in a problem rich environment. (p. 5)

These principles guided the initial drafting of the Everyday Mathematics Program, which began in the mid-1980s. The drafted material was then field tested and formally evaluated. The first edition of the Everyday Mathematics programs was released 10 years after its inception. The goal of the UCSMP team was to produce practical materials that ordinary teachers could use to notably improve the mathematics education of their students (Isaacs et al).

As reported by Carroll (1998), during the 1995-1996 school year, 41 nations took part in the most recent and largest mathematics and science achievement study, the Third International Mathematics and Science Study (TIMSS; as cited in Carroll). The test results from TIMSS provided insights into how fourth, eighth, and twelfth grade students in the U.S. performed in mathematics and science relative to their peers in other nations. Generally, students in the U.S. performed below the international average. The TIMSS researchers suggested five probable reasons for this underperformance.

1. Textbooks in the United States are not as challenging as those in other

nations.

2. Mathematics lessons in the United States focus on rote procedures of conceptual understandings and problem solving.
3. Topics such as geometry, measurement, and algebra are under represented in the curriculum.
4 Although U.S. teachers are aware of reform ideas, they are less likely to implement those ideas than their peers abroad.
5. The United States curriculum is "a mile wide and an inch deep," lacking a focus at each grade. (p. 1)

In response to the concerns raised by the TIMSS (1996, as cited in Carroll, 1998), the researchers at UCSMP reviewed and addressed each concern as it related to the Everyday Mathematics Program which had just been introduced at the time of the TIMSS. According to Carroll, because this program was research based, had an international perspective, and was unique in its approach to curricular development, the concerns addressed by TIMMS had already been anticipated and addressed in the Everyday Mathematics Program.

The staff of Everyday Mathematics Center (2003) described six distinguishing features that are included in every level of the Everyday Mathematics curriculum. These are: (a) real-life problem solving, (b) balanced instruction, (c) multiple methods for basic skills practice, (d) emphasis on communication, (e) enhanced home/school partnerships, and (f) appropriate use of technology. While students may have few problems in the change to a new curriculum, unless guided by a trained teacher, parents will need clear communication to understand the Everyday Mathematics Program because the program is so different than that with which most adults are familiar (Everyday Mathematics, 2002). Often, parents fear that they do not know enough about the mathematics themselves to be able to help their child. Parents must be educated about the Everyday Mathematics

Program in regard to: (a) the process of problem solving, (b) the use of technology, and (c) the methods of ongoing assessments. With the use of the Everyday Mathematics Program, the roles of the teacher, student, and parents change. It now becomes a teacher's professional responsibility to communicate to the family how this program can be used to benefit their child.

## The Role of Games in Mathematics Education

Through play, children observe, explore, and interact with the world around them (Holton, Ahmed, Williams, & Hill, 2001). According to Piaget (1951, as cited in Holton et al.), play is an important factor in the cognitive development of a child because it allows for the assimilation and accommodation of ideas and concepts. It seems only natural, then, that play would be used by children when they are presented with new mathematical situations both in and out of the school setting. Through observation, interaction, and guidance, educators and parents can build on the child's innate interest in play and focus that process toward meaningful learning in mathematics.

The term, mathematical play, was defined by Holton et al. (2001) as the process used to solve mathematical problems, which involves both experimentation and creativity to generate ideas, as well as the use of the formal rules of mathematics to follow any ideas and come to some sort of conclusion. Also, Holton et al. explained that the use of mathematical play provides a nonthreatening environment where incorrect solutions are not seen as mistakes and may actually lead to a better understanding of the problem. Students take part in play at their own level and build on their individual knowledge and understanding. It is the teacher's role to ask questions to clarify the misconceptions and

to provide scaffolding to guide the play in a more productive direction (Bruner, 1985, as cited in Holton et al.).

Mathematical play in the classroom can take several different forms (Skeffington, 2003). It can consist of: (a) free exploration with manipulatives, (b) game play with minimal rules, or (c) a structured game with set rules and goals. Often, child initiated mathematical play can be as effective as adult led activities. According to Skeffington, if children are in a stimulating environment, feel confident and enthusiastic about mathematics, and are given time and space to use their skills, often, they will extend their play with far reaching results.

Teachers can make great use of their student's interest in play if they introduce and encourage the use of games to teach mathematics in the classroom. The idea of using games to engage children in learning activities is not new. Instinctively, children create games to help them make sense of the world around them (Williamson, Land, Butler, & Ndahl, 2004). The challenge for educators is to: (a) provide opportunities and games that promote higher level thinking, (b) offer relevant meaning to the mathematical content being covered, and (c) promote student responsibility in learning.

Flewelling and Higginson (2005) provided comparisons of two types of games played frequently in classrooms. The first type, called the knowledge game, is a teacher led game. It is framed around a very specific task and requires the learner to use knowledge in a narrow, isolated, artificial manner. The student must follow the instructions and rules precisely, and success is measured in the correctness of an answer. The second game is called the sense making game. In this game, the student is the

primary agent in learning. The teacher plays the role as a facilitator. The student is required to think critically, question, make connections, and take more control over learning. While both games, if played well, can prepare a student for success in mathematics, Flewelling believes that the use of the sense making game will prepare the students to be successful in life.

An extension of traditional mathematics games and exploration in the classroom involves the use of the computer. Computer games seem to motivate many students in a way that formal education does not (Facer, 2005). In fact, it is the high level of motivation and interest generated by computer games that educators hope to use to encourage learning in students. Facer explained that the game environment could be used for a variety of learning experiences from routine drill and practice through the complex acquisition of process skills. Additionally, the use of computer programs have been shown to reduce the anxiety associated with the lack of mastery of fundamental mathematics. According to Wittman, Marcinkiewicz, and Hamodey-Douglas (2000), the de-emphasis on drill and practice activities in public education has led to an increase in mathematics anxiety. The use of computer assisted instruction can offer flexibility, individualization, and a sense of privacy to students who struggle with basic mathematics facts. Wittman et al. provided a clear example of how computer programs can help decrease mathematics anxiety in students while, at the same time, they increase basic mathematics skills.

## Chapter Summary

A survey of the literature about the importance of parental involvement in student achievement and an overview of the Everyday Mathematics Program was presented in this chapter. The role of games in mathematics was presented as well. In order to enlist parental support for mathematics education, it is essential that teachers understand the dynamics of parental involvement, that parents are well informed about the mathematics curriculum, and that both teachers and parents realize the importance of games in mathematics education. One attempt to develop a program that will address all of these issues will be detailed in Chapter 3.

# Chapter 3

# METHOD

The purpose of this project was to develop a family mathematics presentation that focused on the enhancement of student achievement in mathematics through the promotion of parental involvement in mathematics education. Although parental involvement has been shown to positively affect children's achievement in mathematics, most parents feel unprepared to help their children in mathematics because the curriculum has changed greatly in the past several years. Therefore, this presentation covered the following topic areas: (a) the Everyday Mathematics Curriculum, (b) mathematics games, and (c) the use of the computer to promote mathematics education.

## Target Audience

The groups or individuals that would be interested in the use of this particular project and its application would be elementary classroom teachers. The instructors would apply this methodology to educate parents and to encourage families to become involved in mathematics outside the classroom setting. Although the project was developed for the fourth grade mathematics curriculum, it could easily be adjusted for any grade level.

## Goals

There were three main purposes to the project known as family mathematics night. The author's first goal was to familiarize parents with the fourth grade, Everyday

Mathematics Program. The author presented a Power Point presentation to provide an overview of the curriculum, describe different mathematics algorithms used in the Everyday Mathematics Program, and review the assessment procedure used in this program. Students assisted their parents with a few mathematical applications to further demonstrate concepts that are unique to the Everyday Mathematics Program.

The second purpose of the project was to promote mathematical learning through the use of games. The author presented several games that are routinely used throughout the school year and then invited the students and their parents to play these games. This time together allowed parents to understand that learning does take place during play.

Finally, parents and their children were introduced to various mathematics computer games that are available on the World Wide Web. Once again, students and their parents had time to explore the websites and play mathematics games together. The parents left family mathematics night armed a mini-guide loaded with a variety of techniques to encourage mathematics learning at home.

## Procedure

The author designed a Power Point presentation to provide an overview of the Everyday Mathematics Program. The presentation took place in the library where a projector was available. The presenter allowed time for questions to be asked during the presentation. A mini-guide was provided to each attendee (see Appendix A). The mini-guide included some of the information that was covered during the presentation, game instructions, and a list for the various websites for mathematics games.

Following the Power Point presentation, the presenter demonstrated several

games that are routinely used during the course of the school year and explained the mathematical concept that was being taught with each games. Following the demonstration, the parents had time to play a mathematics game with their child.

Finally, the presenter accessed the Internet and provided the families with a tour of various different mathematics websites that are appropriate for elementary aged students. Following this presentation, each family was given access to a laptop computer and allowed to explore the mathematics websites. During both of the family activities, the presenter circulated throughout the room providing assistance as needed.

## Peer Assessment

After completion of the family mathematics night, this author asked several experienced teachers to review the project and provide informal feedback. This feedback was used to add, change and/or delete any material that is not relevant; the specifics of the feedback received will be discussed in Chapter 5.

## Chapter Summary

The role of parental involvement in their children's education is undeniably important. It is the job of the educators to enlist the parents to become partners in education. Through this project, this researcher used knowledge gained from an extensive review of literature and personal teaching experience to provide parents with the information and skills needed to promote mathematics outside of the classroom. This, in turn, will help to advance student achievement in mathematics. In Chapter 4, the author provides the Power Point presentation. Discussion and colleague reviews are presented in Chapter 5.

# Chapter 4

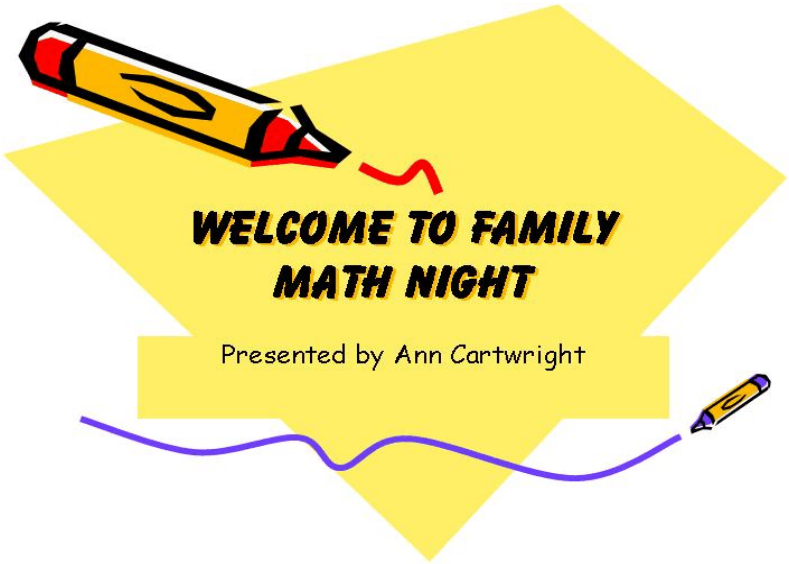
## RESULTS

The purpose of this project was to develop a family mathematics presentation that focuses on the enhancement of student achievement in mathematics through the promotion of parental involvement in mathematics education. The family mathematics night will began with a Power Point presentation that familiarized parents with the fourth grade mathematics curriculum. This presentation provided an overview of the Everyday Mathematics Program, demonstrated different mathematics algorithms used in the Everyday Mathematics Program, suggested ways to encourage mathematical thinking at home, and reviewed the assessment procedure used in fourth grade.

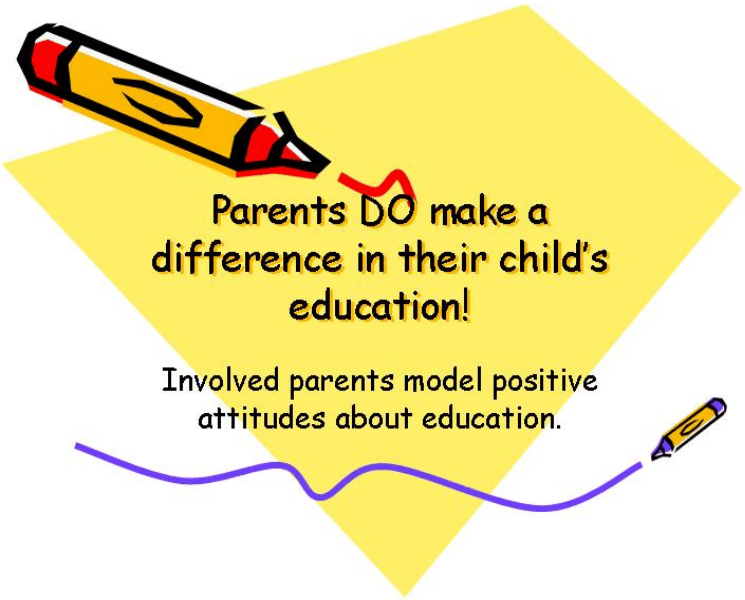
During the second part of the project, the author presented several games that promote mathematical learning. The parents and their children were then allowed time to practice some of the games. This practice allowed parents to understand that learning does take place during play.

The final portion of the family mathematic night was spent learning about various mathematics computer games that are available on the World Wide Web. Students and their parents had time to explore the websites and play games together. Additionally, the parents were provided a mini-guidebook that will expand on information and techniques presented during the family mathematics night in hopes of encouraging mathematical learning at home.

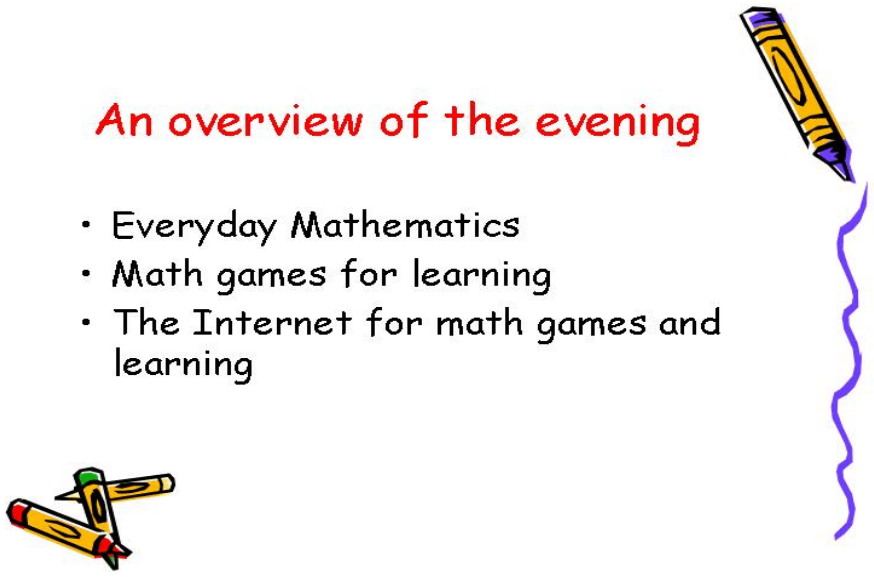
The following section is the Power Point presentation of Family Mathematics Night.



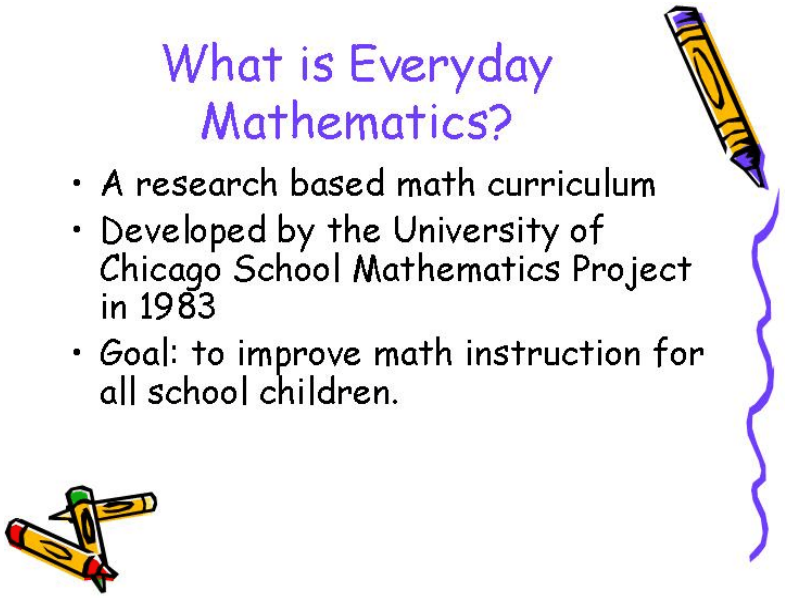

"Welcome everyone and thank you for joining us tonight for our fourth grade Family Mathematics Night. My name is Ann Cartwright and I'd like to introduce you to my teaching partner, Jay Campbell."




"Researchers have learned that parental involvement can boost student achievement in mathematics. Tonight, I hope to provide you with information that will make it easier and more enjoyable for you to help your children become successful mathematicians, both in and out of school."

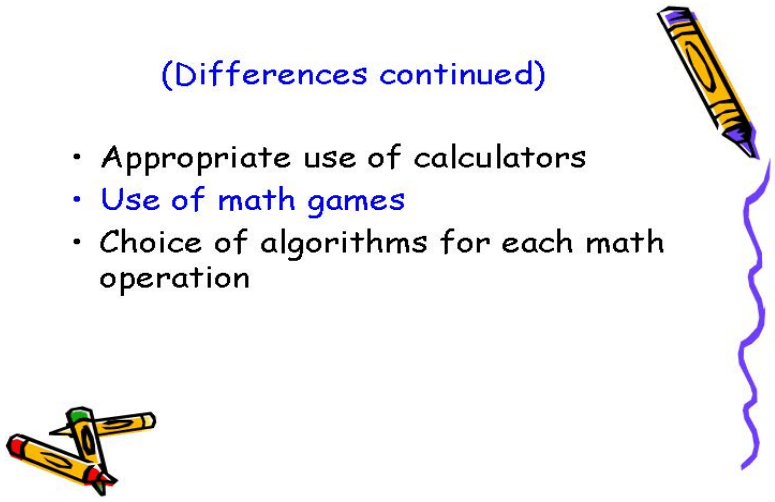



"This evening, I will present an overview of the Everyday Mathematics Program that your child uses everyday in class. We will spend some time working with the mathematical algorithms that your child is learning and I will review the assessments used at the end of each unit of study. Additionally, I will share some tips on ways to encourage mathematics at home. Following this Power Point presentation, you and your children will have the opportunity to learn and play some math games that are regularly used throughout the year in forth grade. Finally, I will share with you some excellent websites for math games and learning."

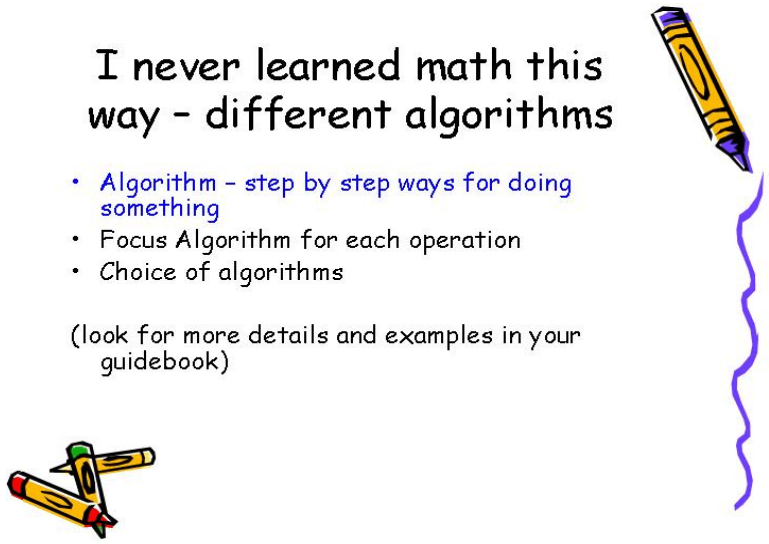



"The Everyday Math Program was developed over a period of 10 years and tested and many sites across the United States. It was developed at a time when math scores and learning in the U.S. were falling behind those of other nations around the world. The developers of this program want to help improve math instruction for all children and they consider parents to be a key component as children strive for excellence in mathematics."

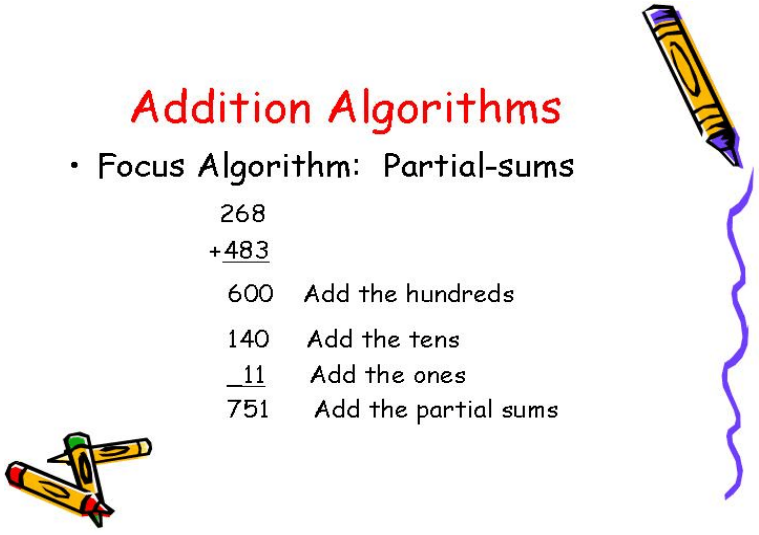

"Everyday Mathematics emphasized the application of math in real world settings. Math skills and concepts are linked to situations that are relevant to everyday activities. For example, students practice adding and subtracting with decimals in the context of bank deposits and withdraws. The program also allows for different kinds of instruction. Your child will have the opportunity to work independently, with a partner, and as a whole group to learn new math skills. Similarly, we offer your child a variety of ways to master basic skills. The Everyday Mathematics program includes fact drills, mental math practice, the use of flash cards, homework, timed tests, and daily review problems. Throughout your child's math lesson, they are encouraged to talk about their mathematical thinking in their own words."



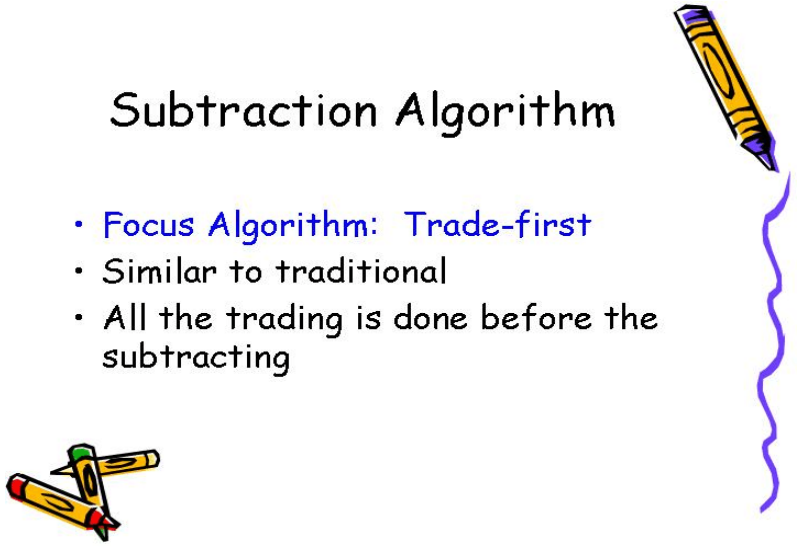

"Students in our classes will also learn how to use calculators correctly and when to use these important tools. Calculators are allowed during appropriate activities, not for basic computation. Your children are also offered the opportunity to practice number skills through the use of games. As you will learn, games make math learning fun. Finally, the Everyday Math program is unique in that it offers your child several different algorithms, or ways of solving, the basic mathematics functions. While there is a focus algorithm taught that is powerful and efficient, every child has the freedom to choose which algorithm works best for him or her."



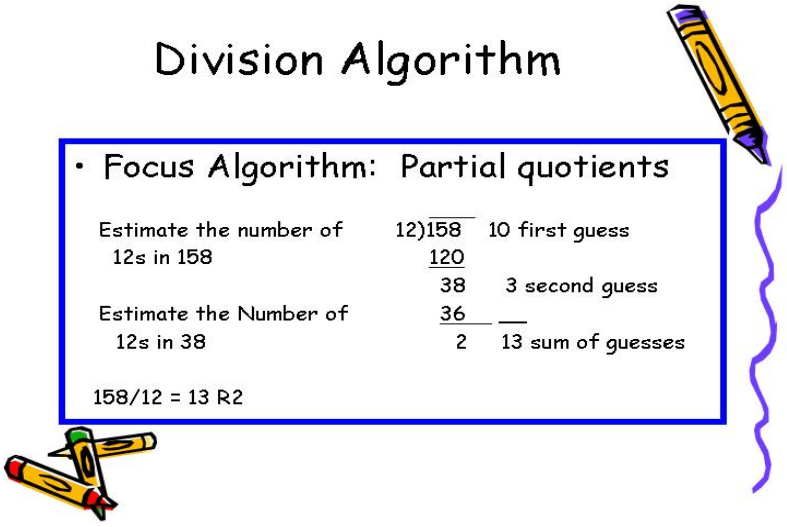

"Algorithms are step by step ways of doing something. Just like you may have different ways to prepare a meal or drive to work, your child is learning different ways to solve mathematics problems. The Everyday Math program includes focus algorithms which are powerful, efficient, and easy to learn and understand. All of your children are expected to become proficient with these algorithms. Once the focus algorithm is mastered, your child can explore other algorithms and then decide on one reliable method for each of the basic number operations: addition, subtraction, multiplication, and division."



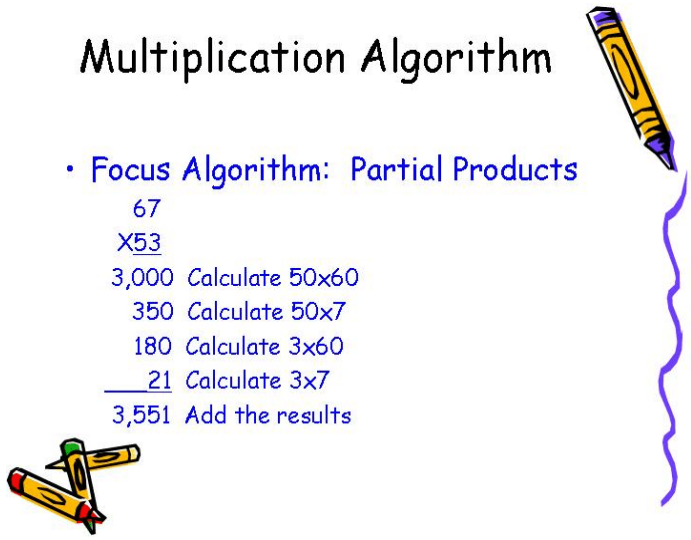

"You can add two numbers by calculating partial-sums. This means that each place value column is added separately and then all the sums are added to get the final answer."



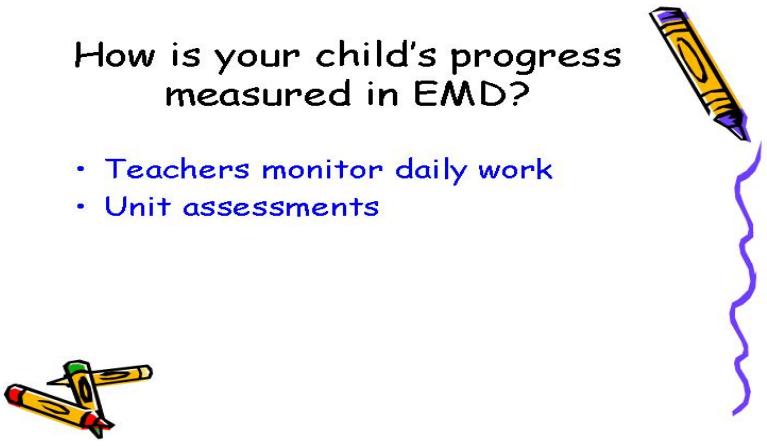

"The only difference that you will notice between this algorithm and traditional subtraction is in the wording used. Your children will say that they trade when subtracting instead of saying that they borrow."



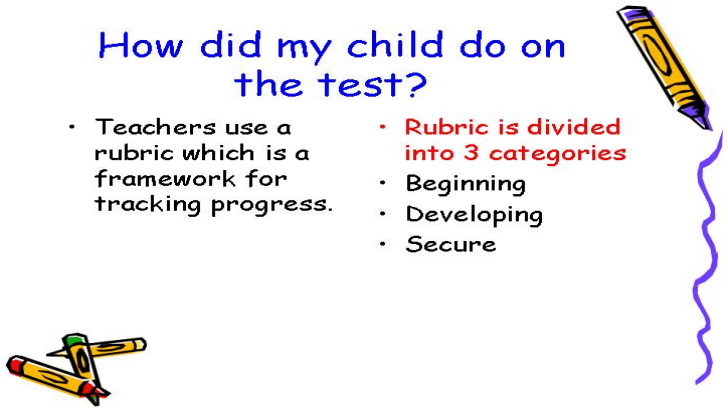

"This is often the most difficult algorithm for parents to understand but it reinforces some basic mathematical skills such as estimating and place values that are essential for fourth graders. This algorithm uses a series of "at least, but less than" estimates of how many parts are in a whole."



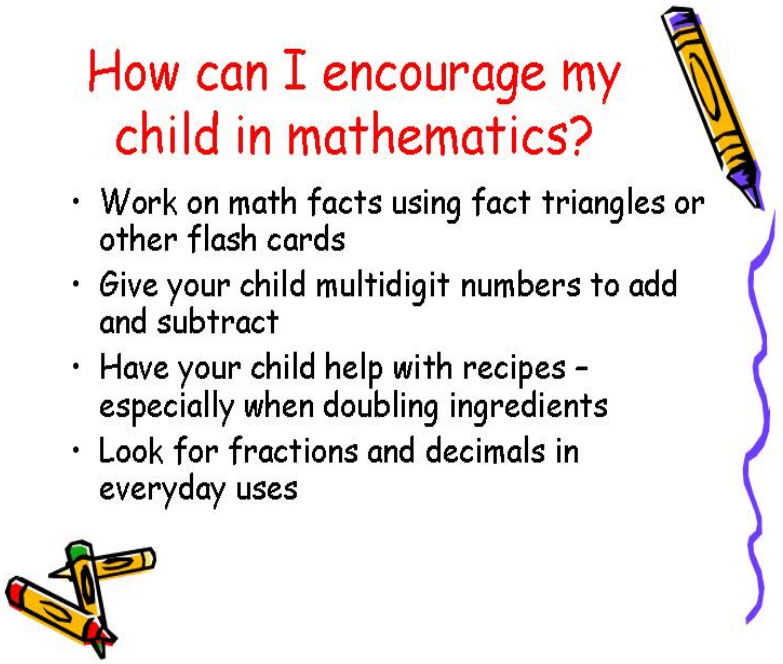

"This algorithm really supports the concepts of place value and number sense in mathematics. The value of each digit in one factor is multiplied by the value of each digit in the other factor."



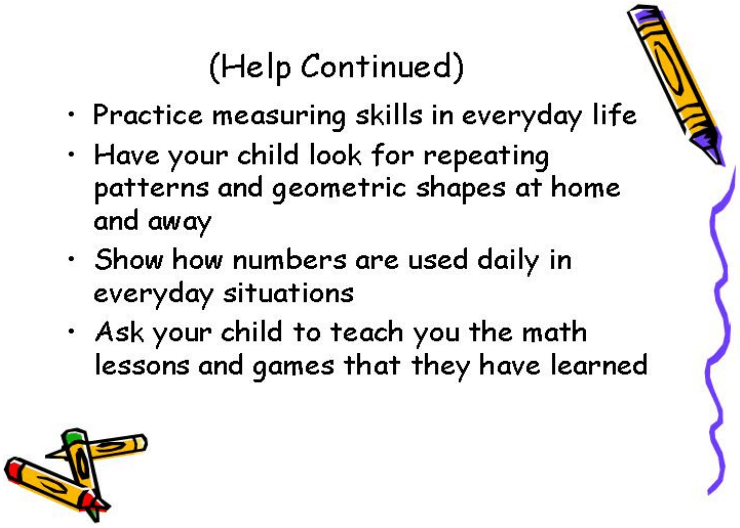

"Each daily lesson offers your child the opportunity for whole class and independent work. As teachers, we constantly monitor your child's mathematical thinking as they take part in group discussions, work in a team, and work independently. We then take this information and are able to focus in and reinforce areas where your child may be struggling. Unit assessments or tests cover the material presented in each unit. Once again, we are able to use the information from each assessment help guide your child's learning."



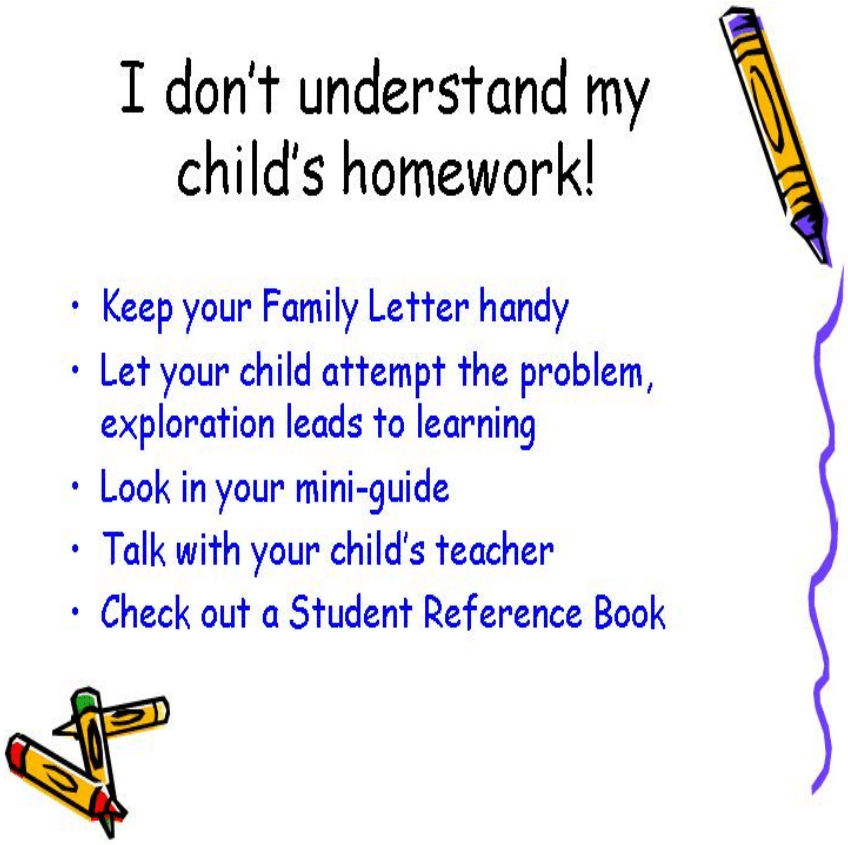

"Typically, your child will bring home an assessment with a rubric attached to it. The rubrics help teachers gauge the progress on the various skills that are taught in a unit. The rubrics are divided into skill sections and each are marked as beginning, developing, or secure. The general expectation level for each skill on the rubric is shaded in. The level "beginning" means that children cannot complete the task independently. They show little understanding of the mathematic skill. "Developing" indicates that children show some understanding and can complete the task with hints or suggestions. "Secure" means that children understand the skill and can correctly complete the task independently. Your child's progress is then marked in the appropriate box on the rubric. Our goal is for each student to reach or exceed the targeted level for each skill."




"Flash cards are a quick way to practice basic math facts. Even though your child is currently focusing on mastering multiplication facts, be sure and practice addition and subtraction facts as well so that these skills aren't forgotten. A fun way to practice addition skills is to have your child add up prices of items that they would like to buy. The kitchen can be the perfect place to practice fractions. Let your child help with measuring, using spoons and cups. Talk about the changes needed to double recipes or to halve them. If you make math interesting and fun, your child will be more eager to learn."

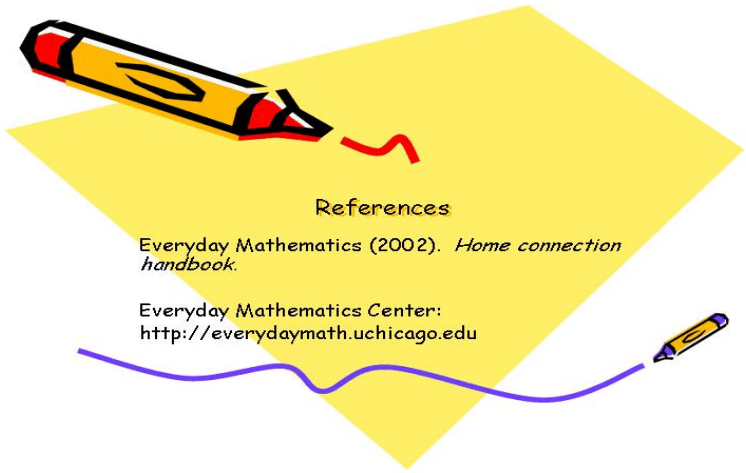



"If you have any job to be done at home which requires measuring, get your child involved. Whether you are measuring wood or material, you child will want to help and can learn valuable skills. Another fun activity is to have your child scour your home for patterns and shapes. Look for patterns in tiles, pictures, and even on clothes. This activity, like the others mentioned, shows your child how math is used in real life. Look for numbers and anything related to math wherever you go. Show your son or daughter how a check book is balanced, show them how to read sports statistics, show them how you figure our which groceries are the best buy, play math games, involve them in math!"




"Now this happens to every family, your child asks for help on his or her homework and you don't have a clue what to do. First, check your Family Letter. It gives examples of problems presented in each unit. Second, let your child explore and try the problem. If he or she becomes frustrated, write a note on the homework and your child's teacher will be happy to help. Don't forget your mini-guide. It has the basics in it for all the algorithms. Finally, talk with your child's teacher. We have Student Reference books that are available for check-out every day."


“Are there any questions?”




"Thank you for listening, now on to the math games."

## Chapter Summary

Presented in this chapter was the information about Family Mathematics Night and the Power Point presentation that was used in the first section of the mathematics night project. In Chapter 5, the author discusses the project, its limitations, and possible ways to enhance the Family Mathematics Night presentation.

# Chapter 5

# DISCUSSION

The purpose of this project was to develop a Family Mathematics Night, to which parents were invited, that encouraged parental involvement in mathematics education thus, enhancing student achievement in mathematics. Parents attending the program (a) became familiar with the current mathematics program used by their children; (b) learned mathematics games to play at home with their children; and (c) were introduced to various child appropriate, mathematics websites on the Internet. Additionally, much of the material presented was recapped in a mini-guide to fourth grade mathematics that was given to all the families.

The Family Mathematics Night was presented to families of fourth graders and to four experts which included 3 fourth grade teachers and an elementary school administrator. They provided informal feedback on the project. Their feedback provided the foundation for the review of this project.

## Objectives Achieved

Many parents want to become involved in their child's mathematics education. By providing the parents with the skills and tools needed to understand their child's mathematics, both educators and parents can become partners in mathematics education and student achievement. The primary objective of this project was to provide parents

with information that would enable them to encourage mathematics and better assist their child in mathematics thus, supporting student achievement in mathematics.

The experts that reviewed this project felt that the Family Mathematics Night was well done and that both the Power Point presentation and the mini-guide booklet provided the parents with useful information. One expert stated "I think the mini-guide should be given to every family when their child enters fourth grade." The experts also indicated that both the hands-on games and the Internet games encouraged families to enjoy mathematics and that they would start families talking about mathematics at home.

The parents that attended the family mathematics night found the Power Point presentation informative and all commented that the section on algorithms was especially useful. They enjoyed playing mathematics games and learning about the mathematics websites. While playing mathematics games, one parent stated that she never knew practicing multiplication facts with her daughter could actually be enjoyable.

Following the presentations, the families were informally surveyed as to the importance of the different sections of the presentation. Every parent stated that the Power Point presentation and discussion, the mini-guide, and the mathematics games were all very important. While the website information was useful, the parents felt that this was one area that they could easily explore and use at home, given the information available in the mini-guide. One parent stated "I would have rather spent more time exploring the different ways to multiply and divide with my son, while you were here to help us."

## Limitations of the Project

It is necessary for educators to realize that the lack parental involvement at school related functions does not necessarily relate to the lack of a parent's involvement with their own child's education. Educators must a consider that demands such as family responsibilities and employment may hinder the parent's ability to attend school functions that are presented in the evening. Ideally, parents should be offered different venues in which to gather the information necessary to promote mathematics to their children. The researcher chose to explore only one venue to provide information to parents because of time constraints.

Several parents believed that it would be useful to have the Power Point presentation and the mini-guide posted on the school's website. An expert added to this by suggesting that a video demonstrating the mathematics algorithms could be added to the material if it was posted on the website. Another expert felt that a few early morning mathematics presentations, complete with coffee and pastries, would reach some parents before they went off to work. One expert felt that this presentation could easily be tied in with an English Language Acquisition (ELA) event and a parent commented that it would be useful to present it at one of the equity meetings that she attends. This same parent stated "then you would have more voices getting the message out that helping our kids is important and we can show them what to do to get the job done." Lastly, the experts and parents all agreed that more time should be spend demonstrating and practicing the mathematical algorithms so that the parents truly felt comfortable and competent when helping their children.

## Recommendations for Future Research and Study

Given the changing demographics within schools in the United States, more research should be done on how to effectively communicate with all the families in a diverse student community. Educators can improve the effectiveness of their dialogue with parents by understanding the cultural and ethnic backgrounds of all students. This is the only way to ensure that the benefits offered by parental involvement in mathematics are available to all the students.

## Project Summary

Presented in this project was review of literature that covered the following topics: (a) parental involvement and student achievement; (b) mathematics achievement; (c) the Everyday Mathematics program; and (d) the role of games in mathematics education. The information from the review of literature was combined with the author's experience to design a Family Mathematics Night program for parents of fourth grade students.

The purpose of this project was to develop a Family Mathematics Night program that would encourage parental involvement in mathematics education thus, enhancing student achievement. Parents attending the program viewed a Power Point presentation covering the Everyday Mathematics program and listing ways to encourage mathematics outside of the school setting. Parents also learned mathematics games to play at home with their children and were introduced to various child appropriate, mathematics websites. The parents were also provided with a mini-guide to fourth grade mathematics that could serve as a tool for parents to use at home while helping their children with

mathematics. Many parents want to become involved in their child's mathematics education but feel that they lack the skills or tools necessary to do this. This project was designed to provide parents with the information and materials necessary to successfully promote mathematics to their children which, by doing so, will lead to student achievement in mathematics.

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# APPENDIX

Mini-guide to Fourth Grade Mathematics

# Mini-guide

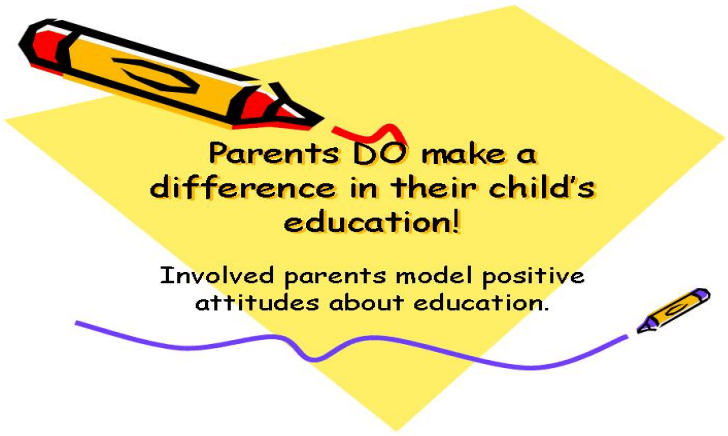
# to

# Fourth Grade

# Mathematics

# at

# Canyon Creek Elementary School




# TABLE OF CONTENTS

# SECTION 1 ALGORITHMS

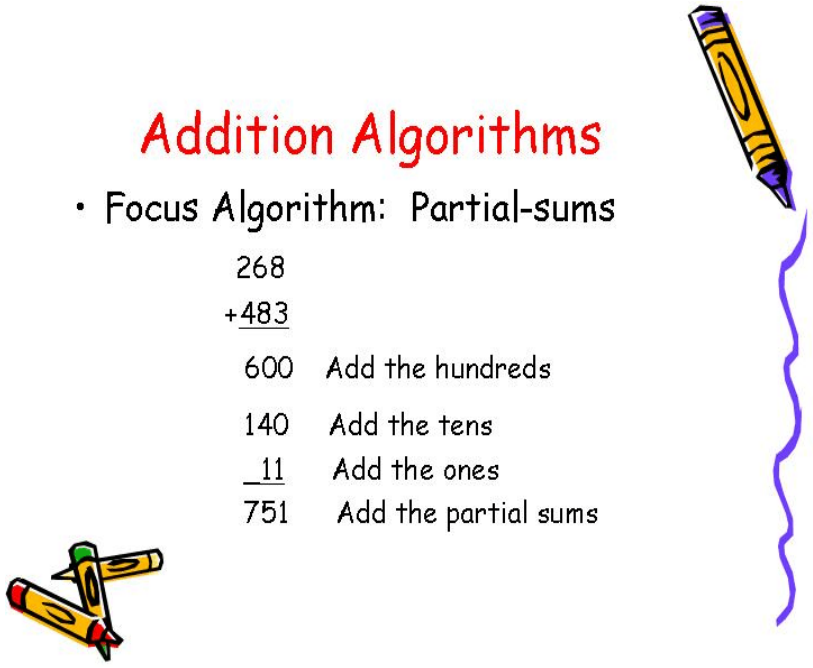
**An algorithm is a step-by step set of instructions for doing something, such as carrying out a computation or solving a problem. Students in the Everyday Mathematics program are introduced to several algorithms for each operation.**

**After instruction and practice, math students are expected to become proficient with at least one algorithm for addition, subtraction, multiplication and division. The Everyday Mathematics program offers a *Focus Algorithm* for each operation. These are powerful, efficient, and easy to understand and learn. Once students can reliably use the focus algorithm, they may use it or any other method to solve problems.**

**The aim of this approach is to promote flexibility**

**and different learning styles while ensuring that all children know at least one reliable method for each operation.**

## ADDITION AND SUBTRACTION



## Subtraction Algorithm

- Focus Algorithm: Trade-first
- Similar to traditional
- All the trading is done before the subtracting

# MULTIPLICATION

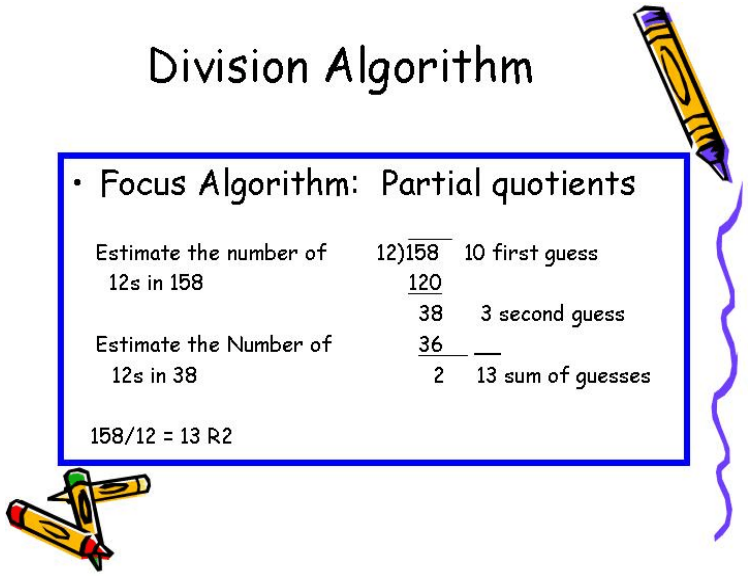
## Multiplication Algorithm

- Focus Algorithm: Partial Products

```
  67
 X53
3,000  Calculate 50x60
  350  Calculate 50x7
  180  Calculate 3x60
 ___21  Calculate 3x7
3,551  Add the results
```

- **The value of each digit in one factor is multiplied by the value of each digit in the other factor.**
- **This algorithm really supports the concepts of place value and number sense in mathematics.**

## DIVISION




**This algorithm uses a series of "at least, but less than" estimates of how many parts are in a whole.**

- **This is often the most difficult algorithm for parents to understand but it reinforces some basic mathematical skills such as estimating and place values that are essential for fourth graders.**

# SECTION 2 MATH AT HOME

**Parents can help their children practice math anytime. Mathematics will mean more to your child if they are related to real-life situations.**

**Here are some activities to try with your children.**

## 1. Basic Math Functions

- **practice math facts with flash cards or by math playing games.**
- **Give your child multidigit addition and subtraction problems.**
- **If you play board or other types of games, let your child keep score.**

## 2. Fractions, Decimals and Percents

- **Have your child look for fractions and percents everywhere. Places to start would be cookbooks, stores, games, nutrition labels on food, newspapers and magazines, and books.**
- **Encourage your child to use math terms such as wholes, halves, thirds, quarters, and fourths in their everyday life.**

## 3. Measurement

- **Work with your child to draw a scale drawing of your home.**
- **Let your child help you with any measuring job around the home such as measuring for new curtains or other home furnishings, measuring for**

carpentry work, measuring fabrics or measuring recipe ingredients.

## 4. Geometry

- Help your child recognize and identify real-world examples of right angles (the corner of a book) and parallel lines (railroad tracks).
- When you are at home or at a store, have your child identify different types of polygons such as triangles, squares, rectangles, pentagons, and hexagons.
- Have your child look for examples of different types of angles in everyday things.

## 5. Patterns and Algebra Concepts

- **Have your child look for and sketch repeating patterns that are seen on buildings, rugs, floors, or clothing.**
- **If your child plays music, talk about and study the patterns of notes and rhythms.**

## 6. Data

- **Help your child look up population, land areas, and other interesting facts about Colorado or other states.**
- **Look for examples of data all around you such as sports statistics, tables and graphs in newspapers and magazines, or on television programs.**

# SECTION 3 MATH GAMES

**Games are a wonderful way to reinforce basic math concepts. When playing math games with your child, make it a positive and fun experience. Let your child be the guide as to the length of time played and the amount of help that he or she needs.**

**The following is only a small sample of the terrific math games that are available. Many more games can be found in math game books and on the Internet. Please contact your child's teacher if you would like help locating these resources.**

## MULTIPLICATION TOP-IT

**Number of players: 2**

**Supplies needed: Deck of cards (remove the face cards)**
**1 penny**

**Directions:**

- **Mix up the cards.**
- **Each player turns over two cards and calls out their product.**
- **The player with the highest sum wins the round and takes all the cards.**
- **In case of a tie, each player turns over two more cards and the player with the highest product takes all the cards.**
- **Play ends when there are not enough cards left for each player to have another turn.**
- **Flip the penny. Heads, the player with the most**

cards wins. Tails, the player with the least cards wins.

## DOMINO TOP-IT GAMES

**Number of players: 2**

**Supplies: A set of dominoes**
**A calculator for the 11 and 12 facts (If needed)**
**1 penny**

- **Can play either multiplication top-it or addition top-it with the dominoes. Please allow your child to use a calculator for the 11 and 12 facts if needed.**
- **Place the dominoes face down between the players.**
- **Each player chooses 2 dominoes and finds the product (multiplication) or sum (addition) of their dominoes.**
- **The games rules are just like regular top-it.**

- **Play until all the dominoes are gone and flip the coin to determine the winner.**

## NAME THAT NUMBER - ADDITION/SUBTRACTION

**Number of players: 2 or 3**

**Supplies: Deck of cards (remove the face cards)**

- **Shuffle the cards and place five cards face up. Put the deck of cards, face down, next to these cards.**
- **Turn over 1 extra card and place it next to the deck of on the other side of the deck. The number of this card is the number to be named.**
- **In turn, players try to name the target number by adding or subtracting any (2 or more) cards from the five face up cards.**

- **If the player used any of the 5 face up cards to name the number, the player picks these up and keeps them in his/her own discard pile.**
- **These cards are replaced from the deck and play continues.**
- **If a player cannot name the number, a new card is turned over and it is the next player's turn.**
- **Play continues until all face down cards have been turned over.**
- **The player who has taken the most cards at the end, wins.**

## NAME THAT NUMBER - ALL FUNCTIONS

- **Follow the same rules as for the addition/subtraction game.**
- **The players may use any math function: addition,**

subtraction, multiplication, or division to name the target number.

## PLACE VALUE CHALLENGE

**Number of players: 2**

**Supplies: Deck of cards (remove the face cards and the 10's)**
**Sheets of paper**

- The object of the game is to make the largest 6 digit number possible using randomly drawn numbers.
- Each player draws 6 blank lines on a sheet of paper to record the numbers that are picked from the deck of cards.
- Shuffle the cards. Player 1 draws one card from the top of the deck and writes the number on any one of the 6 blank lines. Remember, the largest number

**created wins and numbers may not be changed once they are written down.**

- **Player 2 selects the next card from the deck and**
- **writes it down on his/her paper.**
- **The play continues until each player has a 6 digit number.**
- **Each player reads out his/her number and the player with the largest number wins.**
- **Variation: the game can be played by trying to make the smallest 6 digit number, and won by having the smallest number.**

# SECTION 4 INCREDIBLE MATH WEB SITES

## 1. www.coolmath4kids.com

**This site offers math games, math facts practice, and a flash card maker.**

## 2. www.everydaymath.uchicago.edu

**This is the official website for the Everyday Mathematics Program. It offers parents background and general information about the program. The family letters included with each unit are available here for reprint, either in English or Spanish.**

## 3. www.everydaymath.com

**This site offers a very large collection of math websites that can be used to encourage math practice everyday.**

## 4. www.funbrain.com

**This site offers interactive math games that reinforce math computation skills.**

## 5. www.illuminations.nctm.org

**This site offers a library of 90 online, math standards based, activities. It also lists web links to over 700 math resources on the web.**

## 6. www.mathplayground.com

**This site offers math games and logic problems.**